

WHAT IS CLAIMED IS:

- 1           1. A method for analyzing tissue based on quantized magnetic resonance  
data comprising the steps of  
Sub A1>  
2           a) selecting at least one magnetic resonance parameter to characterize a  
body part, organ or tissue,  
3           b) selecting a suitable pulse sequence to quantify that selected magnetic  
resonance parameter,  
4           c) using the selected pulse sequence to acquire multiple sets of magnetic  
resonance signals from the body part, organ or tissue at an unchanged position relative to the  
measurement acquisition system,  
5           d) quantifying the magnetic resonance imaging parameters on a pixel by  
pixel basis,  
6           e) determining biological properties of interest of a body part, organ or  
tissue structure by biological means including histological, biochemical, histochemical, and  
biomechanical,  
7           f) correlating quantitative ranges of the selected magnetic resonance  
parameters with selected biological properties of interest of a body party, organ or tissue.

Sub B1 2. The method as defined by claim 1 wherein in step a) the magnetic  
resonance parameter is selected from longitudinal relaxation time ( $T_1$ ), transverse relaxation  
time ( $T_2$ ), magnetization transfer (MT), and magnetization ratio (MR).

- 1           3. The method as defined by claim 2 wherein the tissue is cartilage.  
Sub A2> 4. The method as defined by claim 3 and further including the step of:  
1           5. creating an image of the tissue based on representation of sets of one or  
2           more quantitative magnetic resonance parameters.  
3           6. The method as defined by claim 1 and further including the step of:  
1           7. creating an image based on representation of sets of one or more  
2           quantitative magnetic resonance parameters.  
1           8. A method for analyzing tissue based on quantized magnetic resonance  
2           data comprising the steps of  
3           a) acquiring magnetic resonance signals from the tissue,

- 4                    b) determining at least one magnetic resonance quality of tissue in each  
5       pixel,  
6                    c) quantizing the magnetic resonance signals pixel by pixel within the  
7       tissue, and  
8                    d) correlating the determined magnetic resonance quality with known  
9       magnetic resonance qualities of tissue.

1                    Sub B1] 7. The method as defined by claim 6 wherein in step c) the magnetic  
2       resonance quality is selected from longitudinal relaxation time ( $T_1$ ), transverse relaxation  
3       time ( $T_2$ ), magnetization transfer (MT), and magnetization ratio (MR).

1                    8. The method as defined by claim 7 wherein the tissue is cartilage.

1                    Sub A3 } 9. The method as defined by claim 8 and further including the step of:  
2       resonance quality.                    d) creating an image of the tissue based on the determined magnetic  
3                    resonance quality.

1                    10. The method as defined by claim 6 and further including the step of:  
2       resonance quality.                    d) creating an image of the tissue based on the determined magnetic  
3                    resonance quality.

1                    11. Magnetic resonance apparatus for use in analyzing a body comprising:  
2                    a) means for establishing a magnetic field through the body,  
3                    b) means for exciting nuclei spins in the body with an RF signal oriented  
4       at an angle with respect to said magnetic field,  
5                    c) means for receiving magnetic resonance signals from the excited  
6       nuclei representative of said nuclei spins,  
7                    d) repeating steps b) and c) to obtain a multiplicity of sets of magnetic  
8       resonance signals and determining a magnetic resonance quality from the body, and  
9                    e) means for quantizing the magnetic resonance quality pixel by pixel  
10      within the body.

1                    Sub B1] 12. Apparatus as defined by claim 11 wherein the magnetic resonance  
2       quality is  $T_2$  relaxation time.

1           13. Apparatus as defined by claim 12 wherein steps b), c), and d) are pulse  
2 echo sequences with varying echo times.

1           14. Apparatus as defined by claim 11 wherein the magnetic resonance  
2 quality is chosen from T1 relaxation time, T2 relaxation time, and magnetic ratio.

*sub art*  
1           15. Apparatus as defined by claim 11 and further including  
2           f) a display for imaging the magnetic resonance qualities pixel by pixel.

*add*      *As*

09020070 "040521